Chapter Five

ACCOMPLISHMENTS OF THE AIR WAR

A number of "firsts" were recorded during NATO's air war for Kosovo. To begin with, Operation Allied Force was the first air war in which all three currently deployed U.S. Air Force heavy bomber types saw combat use. Those bombers constituted a major part of the overall strike force. Of some 700 U.S. combat aircraft committed to the operation altogether, a mere 21 heavy bombers (10 B-52s, 5 B-1s, and 6 B-2s) delivered 11,000 out of the more than 23,000 U.S. air-to-ground munitions that were expended over the operation's 78-day course.[1]

There also was an unprecedented use of precision-guided munitions in the air war. In Desert Storm, only 10 percent of the participating U.S. strike aircraft were PGM-capable. That number rose to 69 percent in Operation Deliberate Force and shot up to 90 percent in Allied Force.[2] Thanks to the heavy use of PGMs in the interest of both operational efficiency and avoiding unintended collateral damage, a full three-quarters of the more than 400 fixed targets attacked in Serbia were assessed as having sustained moderate to severe damage.[3] Some 64 percent of the 9,815 aim points altogether were hit by PGMs, for a total hit rate of 58 percent.[4] Figure 5.1 shows the

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[1]David Atkinson, "B-2s Demonstrated Combat Efficiency over Kosovo," *Defense Daily*, July 1, 1999, p. 1.

[2]Comments on an earlier draft by Hq USAFE/SA, April 6, 2001.

[3]*Kosovo: Lessons from the Crisis*, Report to Parliament by the Secretary of State for Defense, The Stationery Office, London, England, June 2000, p. 36.

[4]"AWOS Fact Sheet," Hq USAFE/SA, December 17, 1999.

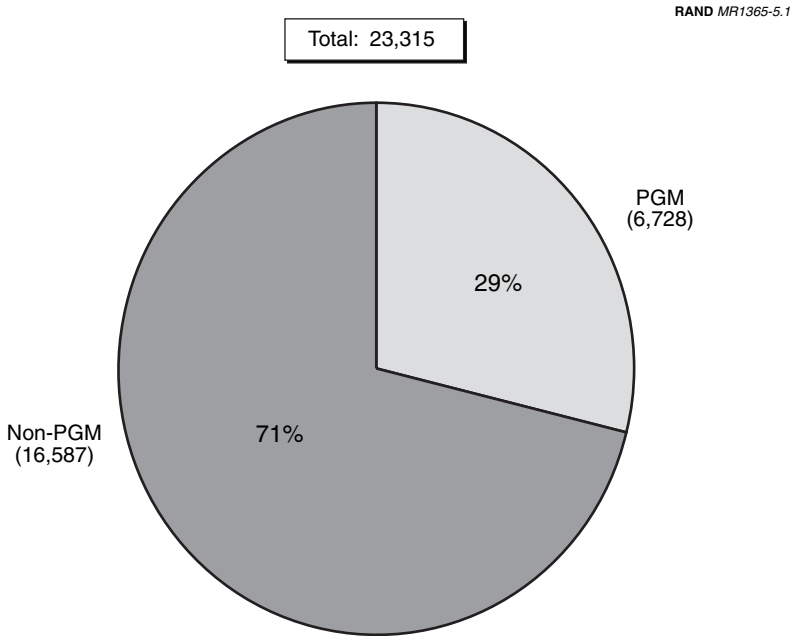

Figure 5.1—U.S. Precision and Nonprecision Munitions Expended

proportion of precision munitions and nonprecision munitions delivered by U.S. combat aircraft over the 78-day course of the bombing effort. At nearly a third of the total number of ground-attack munitions expended altogether, PGM use in Allied Force greatly overshadowed that in Operation Desert Storm nearly a decade earlier. In that conflict, the proportion of PGMs delivered by U.S. forces compared to nonprecision munitions was less than 10 percent.

In addition, more than in any previous U.S.-led air operation, UAVs were used in Allied Force for combat support, most notably for locating VJ troops dispersed in the KEZ.[5] In yet another precedent, the

[5]The qualification "U.S.-led" is appropriate here, considering that the Israeli Air Force has made regular and highly effective use of UAVs over southern Lebanon for nearly two decades, going back to the Beka'a valley air campaign of 1982.

USAF's air expeditionary force (AEF) concept was first successfully exercised in a full-up combat setting, with expeditionary fighter squadrons deploying to Aviano Air Base, Italy, from the continental United States and from U.S. bases in Europe and folding into the anchor 31st Air Expeditionary Wing stationed there, which, at its peak, operated a record 175 combat aircraft.[6] Relatedly, the assignment of tactical control of 12 C-17s directly to USAFE roundly validated that aircraft's "direct delivery" status and reflected a major step forward in the employment of air mobility forces as global assets. Finally, as the discussion below will sketch out in more detail, Operation Allied Force saw the most extensive use of space systems in combat to date, with more than 50 U.S. and European satellites directly involved in support of USEUCOM and NATO intelligence, coordination, and attack activities.

THE COMBAT DEBUT OF THE B-2

Of major note, Allied Force finally saw the long-awaited combat debut of the USAF's B-2 stealth bomber, which was the first manned aircraft to penetrate Serb air defenses the first night.[7] As the final countdown drew near, expectations ran high throughout the Air Force that the regional combatant commanders in chief around the world, who had long resisted the B-2's use in earlier air power applications because of their distrust of unproven systems, would finally be won over by a record of unblemished accomplishment by the aircraft over Serbia and Kosovo. Those expectations were more than vindicated. Of 19 B-2s all told that had been delivered to the aircraft's parent 509th Bomb Wing at Whiteman AFB, Missouri, only 9 were available to USEUCOM for combat operations, with the other 10 undergoing avionics upgrades to the aircraft's definitive Block 30 status.[8] Nevertheless, to the surprise of many, the B-2 turned out to be the most consistently effective performer of the entire air war. According to the 509th commander at the time, Brigadier General

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[6]The wing had most of the essential support assets on hand, so deploying squadrons did not need to bring much by way of logistics overhead.

[7]Dale Eisman, "Over Balkans, It's Beauty vs. the Beast," *Norfolk Virginian-Pilot*, April 26, 1999.

[8]Vince Crawley, "B-2s See Combat over Yugoslavia," *Defense Week*, March 29, 1999, p. 6.

Leroy Barnidge, B-2 operations demonstrated a 96-percent weapons effectiveness rate.

Since only six of the nine available aircraft were actually used on combat missions, the average turn time per aircraft was two days.[9] There was never a shortage of capability to meet USEUCOM's targeting needs, however. Some B-2s were turned in the time it took to refuel them. The only reported case of a B-2 component having failed during a combat mission was a malfunction of a rotary bomb launcher, which was promptly repaired upon the aircraft's return to base.[10] The chief maintenance drivers were said to have been the aircraft's low-observable treatment, its flight control system, its synthetic-aperture radar, and engine accessory drives.

Each B-2 flew nonstop to its targets in its final Block 30 configuration directly from Whiteman on 28- to 32-hour round-trip missions, delivering up to 16 global positioning system (GPS)-guided GBU-31 joint direct-attack munitions (JDAMs) from 40,000 ft, usually through cloud cover, against enemy targets including hardened command bunkers and air defense facilities. Those missions typically entailed 15-hour legs out and back, with two inflight refuelings per leg. Two aircraft were launched on 15 nights and just a single aircraft on 19 nights. The aircrews quickly adjusted to these unprecedentedly long missions and coped with them adequately. They also quickly adapted to the demands of real-time targeting changes en route. Although the USAF bomber community, by virtue of its traditional nuclear focus, had long been predisposed to do things in a carefully preplanned way, USAFE's commander, General John Jumper, traveled to Whiteman and personally talked to B-2 aircrews about the need for rapid adaptability. After just a few hours of intense operator-to-operator brainstorming, any residual doubts some B-2 pilots may have harbored regarding the merits of replacing traditional cold-war practices with real-time improvisation as needed to meet current demands were put to rest. The first time the ensuing air ef-

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[9]Of the nine available B-2s at Whiteman, one was kept aside for training, one was undergoing final upgrades to Block 30 status, and one was in extensive maintenance. "Missouri-to-Kosovo Flights for B-2 Not a Concern to Wing Commander," *Inside the Air Force*, July 2, 1999, p. 12.

[10]"B-2 Performed Better in Kosovo Than USAF Expected," *Inside the Pentagon,* July 8, 1999, p. 11.

fort attempted to apply what came to be called "flex" (for flexible) targeting against enemy assets that had been detected and identified only on short notice, the B-2s took out two SA-3 sites that had been assigned to them only a few hours prior to their planned arrival over target.[11]

In all, 49 B-2 combat sorties were launched out of Whiteman, of which 45 made it to target and were cleared to drop munitions. Although that was less than half a percent of the 9,500 strike sorties flown in Allied Force altogether, the B-2 dropped 11 percent (some 700) of the bombs delivered against fixed targets in Serbia and Kosovo. It also dropped a full third of all precision munitions expended during the air effort.[12] In addition to its normal load of JDAMs, the B-2 was also configured to carry the GPS-guided GBU-37 for special missions against deeply buried or superhardened targets.[13] A total of 652 JDAMs and 4 GBU-37s were dropped, with more than 80 percent of the B-2's assigned targets being hit on a single pass.[14] In a major improvement in the combat leverage and versatility of the American air weapon, the aircraft proved itself capable of operating effectively above weather that grounded all other allied combat aircraft. It also consistently achieved up to 16 separate target hits per sortie.

It bears emphasizing here that the B-2 did not merely drop weapons preprogrammed to home in on assigned coordinates, but used its onboard synthetic aperture radar (SAR) to take two successive images of the target during its initial approach. By so doing, the B-2 was able to eliminate the largest target error source in the JDAM, namely, the error in the exact location of the aim point in GPS space. As a result, the B-2's average miss distance with JDAM was less than half the 13 meters stipulated for unassisted JDAMs.[15]

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[11]"Jumper on Air Power," *Air Force Magazine*, July 2000, p. 43.

[12]Paul Richter, "B-2 Drops Its Bad PR in Air War," *Los Angeles Times*, July 8, 1999.

[13]Adam Hebert, "Air Force Follows Roadmap in Employment of Bombers Against Serbia," *Inside the Air Force*, April 2, 1999, p. 2.

[14]Barry D. Watts, "The EA-6B, E-8C, and B-2 in Operation Allied Force," Northrop Grumman Analysis Center briefing, Rosslyn, Virginia, May 8, 2000.

[15]Barry D. Watts, *The Military Use of Space: A Diagnostic Assessment,* Washington, D.C., Center for Strategic and Budgetary Assessments, February 2001, p. 42.

On most nights, penetrating B-2s received standoff jamming support from Navy or Marine EA-6Bs, as well as SEAD support from orbiting F-16CJs standing by as needed as a precautionary measure. On at least one occasion, however, B-2 strikes occurred without *any* offboard jamming support. Thanks to the aircraft's third-generation stealth properties, it did not require such support to ensure its survivability, and EA-6B jamming for both the B-2 and the F-117 was said to have been "indirect." Supporting EA-6B and F-16CJ pilots were provided with time blocks and rough areas within which the stealthy aircraft would be concurrently operating, but not the exact routing of those aircraft. In the absence of those mission specifics, they relied on time and space deconfliction to maintain safe separation.[16] Because of their low observability and the persistence of overlapping and unlocated enemy SAM defenses, only the B-2s and F-117s were committed against targets in downtown Belgrade for the first 58 days of the operation.[17]

Since every B-2 mission, save one or two, benefited from dedicated offboard electronic countermeasures (ECM) support and was flown against less than top-of-the-line enemy defenses, it remains unclear as to what extent the aircraft's stealth properties were truly tested in modern combat. However, by all accounts the aircraft was never tracked by enemy radar, let alone shot at by enemy SAMs. Unlike all other aircraft that flew combat missions in Allied Force, the B-2 operated autonomously. It simply checked in with the ABCCC as it approached the target area, received a go/no-go code, and pressed ahead to its assigned targets in radio silence. If a target change was required en route, the Combined Air Operations Center (CAOC) could pass essential information to ingressing B-2 aircrews as much as an hour and 45 minutes before the aircraft's scheduled time on target (TOT). That ability to select new targets while airborne enabled the aircraft to take out some enemy SA-3s and their radars shortly after they were located and identified by allied sensors.[18] The

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[16]Watts," The EA-6B, E8C, and B-2 in Operation Allied Force."

[17]Colonel Tony Imondi, 509th Operations Group commander, quoted in Bill Sweetman, "B-2 Is Maturing into a Fine Spirit," *Jane's International Defense Review*, May 2000.

[18]Brigadier General Randy Gelwix, USAF, "Oral Histories Accomplished in Conjunction with Operation Allied Force/Noble Anvil."

B-2's onboard GPS-aided targeting system (GATS) and SAR also allowed the aircraft to find, identify, and successfully attack imprecisely located targets.

As the air war unfolded, former Secretary of the Air Force Donald Rice observed that the B-2, although one of the most controversial weapons in the U.S. inventory, was "proving to be the nation's single most cost-effective attack aircraft."[19] Rice further pointed out that the much-derided stealth treatments on the aircraft had proven themselves durable and reliable and that the aircraft had been consistently flying through inclement weather and returning home in serviceable condition. As for identified shortcomings, the B-2 was found to need a direct satellite link to national intelligence agencies to provide its crew with a more current picture of the electronic battlefield so that the aircraft could be rerouted in near-real time to avoid any pop-up SAM threats that might have been detected after it had taken off. It also became apparent, at least to some observers, that the 509th Bomb Wing's crew ratio of two two-pilot crews per aircraft might need to be increased to four crews, or else that provisions might need to be made for future combat contingencies to allow the B-2 to operate out of airfields closer to the battlespace in the interest of reducing mission times.[20]

Through its consistently effective performance in Allied Force, the B-2 finally validated the "global reach, global power" concept first articulated by the USAF more than a decade earlier. Along with the B-52 and B-1, it showed the value of combat aircraft that are not dependent on bases near the theater of operations. In addition, its consistently successful use of JDAM in near-precision attacks against

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[19]Donald B. Rice, "No Stealth to Pentagon's Bias Against the B-2," *Los Angeles Times*, May 9, 1999.

[20]David A. Fulghum, "Lessons Learned May Be Flawed," *Aviation Week and Space Technology*, June 14, 1999, p. 205. A serious limiting factor affecting the first of these suggested solutions is that doubling the B-2's crew ratio would require either doubling the number of training sorties and hours flown by the Air Force's limited B-2 inventory or reducing the number of sorties and flying hours made available for each B-2 crew member—to a point where their operational proficiency and expertise would be unacceptably compromised. Alternatively, the Air Force is now taking a close look at using RAF Fairford, England, and the island bases of Diego Garcia and Guam as forward staging areas from which to conduct B-2 operations in future regional contingencies worldwide.

high-priority fixed targets irrespective of weather may, at long last, have presaged an end to the six-year U.S. habit of routinely resorting to expensive cruise missiles as a seemingly risk-free way of delivering precision ordnance. Before the start of Allied Force, the Clinton administration had expended nearly 800 cruise missiles, all told, in various punitive attacks against presumed terrorist targets and against Iraq. At a price penalty of as much as $1.5 million a shot in sunk costs, that added up to enough to pay for the purchase of 50,000 JDAMs (for a 62:1 cost ratio).[21]

UAV EMPLOYMENT

Also for the first time in American combat experience, UAVs offered commanders and planners the frequent advantage of real-time video imagery without any accompanying danger of aircrew losses. Some UAVs were flown as low as 1,000 ft above VJ troop positions to gather real-time imagery, which, in turn, occasionally enabled prompt and effective attacks by A-10s and F-16s against the often fleeting targets. Several UAVs were lost when commanders requested closer looks, forcing the drones to descend into the lethal envelopes of Serb AAA and man-portable air defense systems (MANPADS). These losses did not evoke great concern, however, since the UAVs were intentionally sent out on missions that were known ahead of time to be especially risky, including highly classified missions to collect and downlink evidence on Serb atrocities.[22]

The USAF's RQ-1A Predator, with a 24-hour endurance capability, mounted a synthetic-aperture radar that enabled it to track targets through clouds and thereby augment the two E-8 Joint STARS aircraft that were operating adjacent to Kosovo out of Germany. Predator also offered the wherewithal for collecting signals intelligence (SIGINT) through its ability to approach threat emitters more closely than manned aircraft and to monitor low-power transmis-

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[21]William M. Arkin, "In Praise of Heavy Bombers," *Bulletin of the Atomic Scientists*, July–August 1999. Another 218 U.S. and British TLAMs were fired during Operation Allied Force.

[22]"Despite Losses, Backers Say Unmanned Systems Excelling Over Kosovo," *Inside the Pentagon*, June 10, 1999, p. 1.

sions, such as those from cell phones and portable radios operated by enemy ground troops.[23]

The most-advanced Predator was not available when Operation Allied Force began. The USAF initially elected to keep those aircraft at their home base at Indian Springs near Nellis AFB, Nevada, rather than commit them to USEUCOM, owing to its reluctance to accept their delivery from the manufacturer without the accompanying technical manuals it needed to maintain and effectively operate them. (Earlier-generation Predators already operating in the theater were frequently prevented from flying because of their susceptibility to icing.)[24] The USAF finally sent three advanced Predators to its UAV facility at the Tuzla airfield in Bosnia. It took more than a week to get the first Predator airborne over Kosovo, however, because of undisclosed technical difficulties. In the meantime, USEUCOM and NATO were obliged to rely on satellites and higher-flying UAVs for targeting and battle damage assessment (BDA).[25]

One new procedure demonstrated operationally for the first time in Kosovo entailed a clever fusion of UAV sensor and specialized command and control procedures, in which two Predators orbiting at 5,000 ft would provide electro-optical and infrared identification of mobile targets and a third Predator would then use its laser designator and mapping software to provide geolocation, after which orbiting A-10s or F-16s could be called in on the detected target. Several confirmed hits on VJ tanks were made possible by this technique.

Interestingly, Predator was not always used in Operation Allied Force in the manner in which it was originally designed to be used. In addition to target search and intelligence collection, the UAV was also often employed to validate pilot reports of possible SAM or ground-force targets on the move, since the rules of engagement of-

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[23]John D. Morrocco, David Fulghum, and Robert Wall, "Weather, Weapons Dearth Slow NATO Strikes," *Aviation Week and Space Technology*, April 5, 1999, p. 29.

[24]"Air Force Reluctant to Deploy All-Weather Predator UAVs to Balkans," *Inside the Air Force*, April 2, 1999, p. 1. Another concern had to do with a larger requirements debate within the Air Force over whether UAVs developed under a fast-track acquisition process, as was Predator, should be managed like a more expensive fighter program.

[25]Jane Perlez, "Serbs Try to Empty Disputed Province, NATO Aides Assert," *New York Times*, March 29, 1999.

ten required two sets of eyes on a potential target. As General Jumper later explained, those who planned and executed the air effort soon learned that they "had to make forward air controllers out of what had previously been intelligence collectors."[26] The original intended Predator mission was to find targets. What happened as the air war unfolded, however, was that Predator was used instead in the collateral-damage management loop and sent out to put real-time eyes on candidate targets that had already been located but not identified, so as to verify that they were valid military targets.[27]

The U.S. Army's Hunter UAVs operated from the Skopje airfield in Macedonia, with their first operational mission into Kosovo taking place on April 4. Hunter imagery was first downlinked to ground controllers in Skopje and then forwarded either to the CAOC in Vicenza, Italy, or to NATO headquarters in Belgium and to the Pentagon as appropriate.[28] Normally used as a corps asset, Hunter in this instance transmitted real-time video imagery via orbiting satellites and downlinked it directly to the Joint Broadcast System in the United States, which then transmitted it to the CAOC, making for only a one-second delay. Its targets were normally objects of tactical interest against which commanders would not risk a manned aircraft, such as artillery emplacements and dispersed VJ units in the KEZ, which had organic self-protection air defense assets. Much like Predator, Hunter flew whenever the weather allowed. It often would loiter in the vicinity of hot targets to observe munitions impacts and provide real-time BDA.[29]

Both Predator and Hunter operators soon discovered that better sensors were needed for the drones to identify ground targets positively from above 8,000 ft. They also learned that better integration of UAV and manned aircraft operations was essential for minimizing the

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[26]"Jumper on Air Power," p. 42.

[27]One problem pointed up by this mode of operation was the slow flying speed of the aircraft. At a maximum airspeed of only 70 nautical miles per hour, Predator typically required considerable time to get to a previously located target candidate, by which time the latter may have moved to a new location.

[28]Elizabeth Becker, "They're Unmanned, They Fly Low, and They Get the Picture," *New York Times,* June 3, 1999.

[29]Tim Ripley, "Task Force Hunter," *World Air Power Journal,* Winter 1999/2000, p. 122.

danger of midair collisions. As a stopgap toward that end, UAVs were restricted to operating in specially designated airspace, where they experienced a heightened likelihood of being shot at because of their frequency of flight over the same terrain.[30] In all, 25 UAVs operated by all allies went down over the 78-day course of Allied Force as a result either of enemy action or of mechanical failure. The United States lost four Predators, eight Hunters (three to infrared SAMs, one to a radar SAM, and the others for mechanical reasons), and four Pioneers. Germany and France lost a total of six Canadian-built CL-289 drones and two French Crecerelles, most of them in a single week.[31]

After Allied Force ended, General Jumper revealed that had combat operations continued into the summer, the USAF would have started employing a new tactic whereby Predators equipped with laser designators would have been flown under the weather near enemy targets to designate those targets for LGBs once the latter had been released by allied fighters flying at safer altitudes above the cloud cover. Jumper further disclosed that UAVs, having successfully undergone a rigorous operational shakedown over Kosovo, would in the future be used more in the targeting loop than in the intelligence collection loop—patrolling aggressively and making the most of their extended loiter time to seek out and identify hidden targets.[32]

THE CONTRIBUTIONS OF SPACE

Among the many U.S. and European space systems that were involved in supporting the planning and execution of air attacks, the most pivotal were classified U.S. satellites that provided imagery support, including transmissions directly through new National Reconnaissance Office (NRO) data reception hardware which had been

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[30]David A. Fulghum, "Joint STARS May Profit from Yugoslav Ops," *Aviation Week and Space Technology*, July 26, 1999, p. 74.

[31]William M. Arkin, "Top Air Force Leaders to Get Briefed on Serbia Air War Report," *Defense Daily*, June 13, 2000, p. 1. For further details on UAV operations, see Lieutenant Commander J. D. Dixon, "UAV Employment in Kosovo: Lessons for the Operational Commander," paper submitted to the Naval War College, Newport, Rhode Island, February 8, 2000.

[32]David A. Fulghum, "Kosovo Conflict Spurred New Airborne Technology Use," *Aviation Week and Space Technology*, August 23, 1999, p. 30.

installed in the 31st Air Expeditionary Wing's Tactical Integrated Planning (TIP) center at Aviano Air Base, Italy; Defense Meteorological Support Program (DMSP) satellites that provided weather imagery down to 1,000-ft resolution; the GPS satellite constellation which enabled the consistently accurate delivery of JDAMs by B-2s; and various NRO data relay and SIGINT spacecraft. Other allied space assets used in Operation Allied Force included the NATO-4 communications satellite, a British Skynet satellite, the French Telesat Syracuse system, U.S. Defense Satellite Communications System (DSCS) satellites, and ultra-high-frequency (UHF) follow-on satellites.[33] After the effort ended, U.S. Space Command estimated that 80 percent of the spaceborne communications used during Operation Allied Force had been transmitted via commercial satellite systems.[34]

At least five notable space success stories came out of the Allied Force experience. The first was the effective use of the Multisource Tactical System (MSTS) on the B-52 and B-1, which gave bomber crews real-time situation awareness updates. The system had existed before but had never previously been used in combat. The second major success story was the highly successful use of GPS-guided munitions described earlier, most notably JDAM on the B-2 and the Navy's TLAM II. Third was the use of the Defense Support Program (DSP) satellite constellation for providing real-time battle damage indications (BDI) as an input into the BDA process. New procedures toward that end were created and refined for Allied Force that had never before been used.[35] Fourth, the Hook 112 survival radio was available for use by U.S. aircrews, making an important new role for space-enabling systems in CSAR.[36] Finally, command and control

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[33]Craig Covault, "Military Space Dominates Air Strikes," *Aviation Week and Space Technology*, March 29, 1999, pp. 31–32.

[34]Peter Grier, "The Investment in Space," *Air Force Magazine*, February 2000, p. 50.

[35]On the other hand, cockpit multifunction display videotapes showing successfully impacting munitions were *not* used in the BDA process by the Joint Analysis Center at RAF Molesworth, resulting in numerous revisits to targets that were already known by attacking pilots to have been struck before to good effect. Conversation with Lieutenant Colonel Ray Dissinger, Aviano AB, Italy, June 12, 2000.

[36]The Hook 112 was developed by the Air Force for use between downed aircrew members and CSAR forces to eliminate a problem presented by the previous survival radio, which allowed enemy monitors to locate the downed crewmember's position by

personnel in the CAOC coordinated the tasking of terrestrial intelligence, surveillance, and reconnaissance (ISR) assets—notably the USAF's U-2s and RC-135 Rivet Joint electronic intelligence (ELINT) aircraft—with space-based ISR assets (that is, national satellite systems) to a level never before achieved in a wartime operational setting.[37] In all, reported the USAF's chief provider of operational space support to warfighters at all levels, space integration into Allied Force was "the most extensive seen to date." But there was still ample room for further improvement in such areas as space doctrine, better education regarding the nation's space capabilities for prospective users, and better integration of these capabilities into the contingency plans of air component commanders worldwide.[38]

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triangulating on the relatively lengthy voice exchanges required to coordinate a rescue by CSAR teams. The Hook 112 communicates the downed crewmember's position by means of an encrypted burst transmission that denies enemy monitors the ability to triangulate. A GPS receiver incorporated in the Hook 112 automatically transmits the crewmember's exact location, along with any coded transmissions the downed crewmember may wish to communicate. Major General Gary Dylewski, "The USAF Space Warfare Center: Bringing Space to the Warfighter," in Peter L. Hays et al., eds, *Spacepower for a New Millennium: Space and U.S. National Security,* New York, McGraw-Hill, 2000, p. 96.

[37]"Space Support to Operation Allied Force: Preliminary Lessons Learned," briefing to the author by Colonel Robert Bivins, director of operations, U.S. Air Force Space Warfare Center, Schriever AFB, Colorado, February 25, 2000.

[38]Major General Robert Hinson, commander, 14th Air Force, "Space Doctrine Lessons from Operation Allied Force," command briefing, Vandenberg AFB, California, December 16, 1999.